PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of:

Applicants : David B. Smathers, Francis S. Valent, and Michael J. Regan
Serial No. : 10/527,513
Filed : October 26, 2005
Title : PROCESS FOR MAKING DENSE MIXED METAL Si_3N_4 TARGETS
Docket : 020324 223P2
Examiner : Jie Yang
Art Unit : 1793
Customer No.: 33,805

Mail Stop AF
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Sir/Madam:

DECLARATION OF DR. DAVID B. SMATHERS UNDER 37 CFR 1.132

[0001] I, David B. Smathers, declare that:

[0002] I am familiar with the Office Action of May 7, 2009 in the above application, and with the references cited by the Examiner in that Office Action.

[0003] In support of his rejection of the claims of the above application, the Examiner concludes that tungsten and titanium are equivalent to each other in terms of the claimed sintering method which is used to make a sputter target that is used to provided heated layers for inkjet printers.

[0004] The Examiner bases his support on U.S. Patent 6,242,374 (Komatsu). It is most respectfully submitted that this conclusion is not technically accurate. Initially, it is noted that the '374 teaches that oxides, carbides, nitrides, silicides, and borides of Ti, Zr, V, Mb, Ta, Cr, Mo, and W may be provided in the disclosed silicon nitride sintered body. This teaching is not at all relevant to issues pertaining to whether elemental tungsten and elemental titanium would be considered as functional equivalents in a silicon nitride blend.

[0005] More importantly, it is much more difficult to blend elemental tungsten powder into Si_3N_4 powder than it is to blend titanium powder into the Si_3N_4. The Si_3N_4 powder has a low density of 3.2 gm/cm^3 whereas elemental W has a density of 19.3 g/cm^3. In contrast, Ti has a density of 4.549 g/cm^3 and due to the fact that its density is quite close to that of the Si_3N_4, it would be easily blended with the Si_3N_4.

[0006] Due to the much denser nature of the elemental W powder, we had to find an effective adjuvant or sintering aid to form a homogenous mixture so that the blended mixture could be loaded into a vacuum hot press or the like.

[0007] Accordingly, the properties of the elemental W powder and Ti powder are vastly different with regard to their capability of blending with Si_3N_4 powder and would not be viewed as being "functional equivalents" in this capacity.

[0008] Additionally, the Examiner believes that MgO is the functional equivalent to Al_2O_3 and Y_2O_3 in the capacity of sintering with Si_3N_4. In the presently claimed method wherein W is blended with Si_3N_4, MgO is not functionally equivalent to Al_2O_3 and Y_2O_3.

[0009] MgO is highly hygroscopic, and this increased hygroscopicity allows the dense W particles and light Si_3N_4 particles to bind in the form of a stable, pasty, agglomerated mass. This would not result if Al_2O_3 and Y_2O_3 were used since these materials do not possess the requisite hygroscopicity. It is pointed out that forming a stable blend of W and Si_3N_4 is very difficult due to the large density differences between these components.

[0010] I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under §1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Signature: David B. Smathers
David B. Smathers

Date: August 5, 2009